THE BIRD FLEAS OF EASTERN NORTH AMERICA

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"The collectors of warm-blooded vertebrates. . .." wrote Karl Jordan (1929), "who should and might be the chief source of increase in our knowledge of the species of ectoparasites, as a rule neglect to collect the Arthropods occurring on mammals and birds obtained, lack of time frequently combined with a narrowness of outlook preventing the collector from going beyond the amassing of skins."

Parasitologists have complained for generations that nonparasitologists have not taken the proper interest in parasites. On the other hand, the literature of parasitology is filled with erroneous host determinations because the parasitologist has not taken the proper interest in birds and mammals. If, indeed such complaints have any validity today, it frequently stems from a simple lack of information rather than willful neglect or "narrowness of outlook." Outside his own field of specialization, the biologist is likely to be ignorant of the special techniques of finding and collecting specimens: of getting to the person most likely to use them; and most important, of the status of research in this unfamiliar field and of the potential value of any collections he might make.

This paper, therefore, attempts to survey for ornithologists the current status of knowledge of bird fleas in eastern North America, in the hope of stimulating collection of bird fleas and thus filling the numerous gaps in knowledge which will be indicated herein.

The study of fleas in North America, and indeed throughout the world, had its origins in the last decade of the nineteenth century. Carl Baker in the United States, N. C. Rothschild in England, and Julius Wagner in Belgrade began to work with this group almost simultaneously, and within two decades had laid the foundations of all our modern knowledge. In the intervening years, the fleas of American mammals have been rather thoroughly collected, while bird fleas, for some unknown reason, have been relatively neglected. The resultant lack of information is exemplified in the recent report by Geary (1959) on the fleas of New York. For the five common species of bird fleas, a total of 40 records was listed. Even the common and widespread chicken flea, *Ceratophyllus gallinae*, was represented by only 16 records. In contrast, common fleas found on rabbits, deermice, gray squirrels, and short-tailed shrews were represented by 75 to 100 records each. Obviously, additional collections of bird fleas must be made in order even to sketch the distribution of the most common species.

Since 1959, we have been gathering specimens wherever possible, but it

has become obvious to us that this project requires the cooperation of many collectors, bird banders, and especially persons who maintain birdhouses. Specialists in the study of fleas are too few and too widely scattered to accomplish the necessary fieldwork, but every community across the nation has its birdhouses. We would like to present a challenge to the many people interested in birds to provide the collections on which advances in our knowledge of bird fleas must be based.

All species of bird fleas currently known from eastern North America are included in the following accounts. Mammal fleas which have been recorded occasionally from birds are not included.

SPECIES ACCOUNTS

Echidnophaga gallinacea (Westwood).—The sticktight flea, introduced to North America from the Old World, is characteristically southern in distribution, but there are records from as far north as Rhode Island. It occurs on a great number of birds and mammals, deriving its common name from the fact that it attaches itself more firmly and more permanently than most other fleas. In the Southeast, it has been incriminated as one of the carriers of endemic typhus.

Ceratophyllus borealis Rothschild.—Although it is common in England and Europe, this flea occurs on the North American list only because of a single record from Greenland. It has been found on a variety of birds and, according to Smit (1957), it is especially common in nests of the Wheatear. Students of northern birds should look for it in nests of the Wheatear on the continent, where there seems to be no good reason for it to be absent.

Ceratophyllus celsus celsus Jordan.—In New York, this is the characteristic flea of the Cliff Swallow. Holland (1949), however, considered it a specific parasite of the Bank Swallow. Evidently it infests different hosts in different parts of its coast-to-coast range. Many more records are needed from the easily collected nests of the recorded hosts in order to determine its host distribution in different areas.

Ceratophyllus diffinis Jordan.—This is a nonspecific flea, which has been taken primarily in the northeastern United States and adjacent parts of Canada. Its range is transcontinental, however, the type locality being in British Columbia. Hosts include such diverse species as Ruffed Grouse, House Wren, Brown Thrasher, Catbird, bluebird, Robin, Ovenbird, and Savannah Sparrow. Largest numbers have been secured from ground nests, where it should be further sought.

Ceratophyllus gallinae (Schrank).—Because of its affinity for domestic fowl, this is the most commonly collected of all our bird fleas. It is commonly found on House Sparrows, and there are records from a variety of other wild birds. A record of *C. niger* Fox, cited by Stewart (1928, 1933) as occurring in New York, is quite certainly an error and should be referred to this species (cf. Geary, 1959:45).

Ceratophyllus garei Rothschild.—This species is Holaretic in distribution and is found on a variety of hosts, largely ground-nesting species. It appears to be more common in western North America than in the East, but this may be due to lack of collecting in our area. It should be especially sought in nests of waterfowl and shore birds, although it is by no means confined to these hosts.

Ceratophyllus idius Jordan and Rothschild.—Most of the records for this species are from Tree Swallow nests, but it has been recorded frequently from Purple Martin nests

and at least once each from Barn Swallow, House Wren, and bluebird. It occurs across the continent, and should be looked for wherever Tree Swallows breed.

Ceratophyllus lunatus tundrensis Holland.—This is probably not a bird flea, but since it is a member of the bird flea genus and is relatively poorly known, we have included it. Thus far, it appears to be a parasite of weasels, as is the nominate subspecies in the Old World. It is a northern species, records in eastern North America being from the Hudson Bay Region and Quebec. Dr. Holland informs me (in litt.) that his collectors have searched many bird nests in areas where this species occurs without finding it, but have taken numerous specimens from weasels.

Ceratophyllus riparius riparius Jordan and Rothschild.—This subspecies occurs across North America in nests of Bank Swallows and Rough-winged Swallows, and also occurs in Asia. In Scandinavia, it is represented by another subspecies, *C. r. jreyi*, while a closely related species, *C. styx*, infests Bank Swallows elsewhere in Europe. Because females with a seventh sternite like that of *C. styx* occasionally occur in North American populations, we have suggested (Benton and Shatrau, 1962) that these populations might be conspecific. Rothschild and Smit (1955), however, consider the two species quite distinct.

Ceratophyllus rossitensis swansoni Liu.—The European form of this subspecies occurs on crows, but early records from North America were from nests of Long-eared Owls. Holland (1954), however, recorded numerous specimens from crow nests in Canada, and it appears that this is the true host. In view of the abundance of crows, it seems remarkable that this flea has been so seldom recorded. It should be sought both in crow nests and in nests of other birds superimposed on old crow nests. It probably occurs across the continent.

Ceratophyllus scopulorum Holland.—This species was discovered in northwestern North America, and has been collected only once in the East. These collections were from nests of Barn Swallows and Cliff Swallows on Kent Island, New Brunswick (Benton and Shatrau, 1962). Whether it occurs throughout the intervening area must be determined by further collecting.

DISCUSSION

It is evident from the paucity of records cited above that the knowledge of eastern bird fleas is extremely limited. Within the past 15 years at least eight new species of bird fleas have been described from western North America, while none have been discovered in the East. Whether or not any new species remain to be discovered, it is certain that much more work is needed to elucidate the distributional patterns and host relationships of these parasites.

Two problems are particularly tempting. No eastern bird flea is known from woodpeckers despite the fact that two species are known in the West, from species which are transcontinental in occurrence. One was described from a Downy Woodpecker (Holland and Loshbaugh, 1958), another from the nest of a flicker (Holland, 1960). There are also woodpecker-infesting species in the Old World. It seems reasonable to expect that eastern species too may be found to harbor fleas when they are carefully studied.

The second problem of special interest is the distribution of fleas in the nests of sea birds along the east coast. Several species of fleas occur in similar

situations along the coast of Britain, in nests of gulls, petrels, puffins, and cormorants which also nest on our side of the ocean. One would expect that extensive collecting from nests of these species would add new flea species to the North American list.

Bird fleas are most commonly found in the nests of hole-nesting or box-nesting species, frequently in large ground nests or those located in moist environments, and less commonly in aboveground nests. All species of swallows appear to be regularly infested, but there are puzzling regional patterns. In New York we have examined the nests of many Barn Swallows without finding a single flea, while nests of the same species from New Brunswick yielded abundant specimens of two species. Further, as indicated above under the discussion of *C. celsus*, the same flea may infest different hosts in different areas, while different fleas may be found on the same host species in different parts of its range. Many more collections will be necessary before we can delineate the extent of these variations or attempt to understand their significance.

TECHNIQUES

Fleas are most abundant in nests, and this fact dictates the most fruitful method of collecting. Recently abandoned nests may be placed in a tightly sealed plastic bag, with data on the host species, date, and locality. The easiest way to secure the fleas is to insert some killing agent into the bag and collect the dead fleas. Since fleas are still emerging from pupation, however, a larger number will be secured if the nest is placed in a Berlese funnel for several days. Still more may be secured if the nest is kept in the bag for several weeks, and fleas are collected periodically by placing the nest in a deep pan and collecting the fleas with an aspirator as they crawl from the nest. Fleas are preserved in 70% alcohol until they can be mounted for identification.

Occasionally fleas are found on birds away from the nest, and young birds in particular may have quite heavy infestations. Bird banders and collectors are in a position to take advantage of this fact to make significant collections. Bird fleas are relatively large and dark colored, and may generally be detected by ruffling the feathers. Fingers or an aspirator may be used to capture these agile parasites, and they may then be dropped in a handy dish of alcohol. On dead birds, fleas may be captured more readily if the bird is placed in a plastic bag and a killing agent added. Even without the killing agent, fleas will usually leave the host or at least move to the outer ends of the feathers as the host cools, and thus are quite easily captured.

IDENTIFICATION

Unfortunately, the preparation of fleas for identification is a rather lengthy process and most ornithologists would not care to go through with it. Further-

more, there is (pending the appearance of Volume 4 of the catalog of fleas in the British Museum) no adequate key to the bird fleas of eastern North America. The best is that of Holland (1951), but this key does not include all species now known to occur in the East. Unless the collector has access to a large library and an extensive comparative collection, he will probably wish to have the fleas identified elsewhere.

Facilities for the identification of fleas are available both at the Entomology Research Institute, Canada Department of Agriculture, Ottawa, and at the United States National Museum, Washington. Vials containing fleas with adequate data are welcomed, particularly if the institution is permitted to keep all or part of the material submitted. In addition, fleas sent to the senior author of this paper will be identified promptly.

SUMMARY

Ten species of bird fleas are known from eastern North America. Each species is discussed, and information is given on the techniques for collecting bird fleas and on facilities for identification of these collections.

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NEW LIFE MEMBER

Mr. Charles E. Nelson, Jr., of Dousman, Wisconsin has recently become a Life Member of the Wilson Ornithological Society. A graduate of the University of Wisconsin, Mr. Nelson is president of the Waukesha Motor Company. One of the many dedicated amateur ornithologists in Wisconsin, he has been extremely active in the affairs of The Wisconsin Society for Ornithology and has served as President of that organization. Mr. Nelson is married and has two children.